SPECIAL ARTICLES

CARDS AS PSYCHOLOGICAL APPARATUS

"THREE thousand dollars a year for a good instructor and one dollar for paper and pins" are considered a sufficient equipment for a fair elementary psychological laboratory by at least two distinguished American psychologists. The present paper is a brief account of some of the uses that may be made of paper in one form only, playing-cards, picture post-cards and library cards as found on the market. The uses described here relate to former work, to work now being done and to further possibilities.

In general, cards commend themselves as suitable experimental material on account of their cheapness, accessibility, generality, more or less familiarity and their standard nature in shape, size, weight and quality. The standard nature of the playing cards needs no qualification, and the variations of picture post-cards in shape, form, design, etc., are easily described and their pictorial features readily reproduced when necessary.

The frictionless or slipping quality of playing cards commends them for work requiring speed; they were first used in this connection by Jastrow[1] to determine the so-called discrimination (distinction) and choice time. And as a class demonstration of the time relations of these two mental processes the cards remain perhaps as simple and as cogent as any material now in use. Seven years later Professor Bergstrom[2] used "unprinted cards with the best slipping qualities" to study the resistance or interference offered by an old habit to the acquisition of a somewhat related one. He took advantage of the diminishing states of resistance to measure the rate of forgetting a habit. And further study has shown that an established habit may not simply interfere, but that it may also favor the acquisition of a new habit, *i. e.*, an old habit may blow both *cold* and *hot*, as it were, in its effect upon a learning process, and thus a study of the potency of one learning process upon another is made possible by the use of cards. Coover and Angell[3] determined the effect that skill in tossing colored cards into six small compartments bearing colored labels has upon the rate of manipulating the typewriter. In such experimentation playing-cards have proved exceptionally useful[4] for the reason that the processes involved in their use are susceptible of analysis to the unitary stage. So that it becomes possible to make a quantitative estimate of the units of transference and interference.

The study of the "Learning Process" begun in this country by the original work of Bryan and Harter[5] on "learning telegraphic language" inspired psychologists to draft the instruments of both work and play into the service of experimentation. The hand-ball and short-hand,[6] the game of chess[7] and the typewriter[8] have each in turn made notable contributions to the learning process. But it is evident that neither these instruments nor their uses are adaptable to the laboratory as class apparatus. Economy of time alone forbids. Hand-balls are inexpensive, but ball-tossing as a learning process is narrow in its range and the operation too fantastic for laboratory purposes. There is need of simple ways and means whereby individuals of large classes may participate in the experimental operations. Among the more successful means now in use are nonsense syllables[9] and the principle of reciprocal substitution of letters, figures and conventional symbols devised by Jastrow. We would add to the list the use of playing-cards *in connection with a distribution-case.* The case and its uses require a brief description.

We have found that a case 18 inches high, 36 inches long and 4 inches deep will furnish space for 54 compartments, having six in the vertical dimension and nine in the horizontal.

[1] SCIENCE, Vol. VIII., 1886.
[2] *Amer. Jour. Psy.*, Vol. 5, 1893.
[3] *Amer. Jour. Psy.*, Vol. 18, 1907.
[4] Kline and Owens, *Psych. Rev.*, Vol. 20, 1913.
[5] *Psych. Rev.*, Vol. 4, 1897.
[6] Swift, *Amer. Jour. Psy.*, Vol. 14, 1903.
[7] Cleveland, *Amer. Jour. Psy.*, Vol. 18, 1906.
[8] Book, Wm. F., Univ. of Mont. Studies, 1908.
[9] Ebbinghaus, "Ueber das Gedachtniss," 1885.

This arrangement furnishes a compartment for each card of the pack of fifty-two, and at the same time preserves an approach to equality between the dimensions without a large excess of compartments. Each compartment is three and a half inches in length by two and three fourths inches in height, and admits completely the average playing-card when *tossed*. Each compartment is provided with a metal clip for holding detachable labels cut from the cards.

Even one unacquainted with card games and card lore will realize upon slight reflection the well-nigh endless variety of combinations made possible by their qualities of form, color and number. The case is so labeled that the opportunity for forming associations between contiguous boxes and two or more successive distributions is rare. The cards may be unstacked or stacked, according to purpose. If the latter then learning the order of the cards affords a method for the study of serial learning. The compartments receiving the cards for any series are viewed only during the process of distribution, thereby creating conditions for the study of the sense of position. Perhaps we shall make better progress in suggesting the possibilities of problems and methods by briefly submitting a problem.

Let *A* distribute the pack according to number and color, throwing to the *diamond* and *club* compartments only. This requires 26 compartments, 13 of which receive the like numbered red cards and 13 the like numbered black cards. Let *B* distribute the pack to 26 compartments throwing to the red labels according to the following plan: Throw spades to hearts, and clubs to diamonds of the same number; *e. g.*, K and Q of Clubs would go to K and Q of diamonds, respectively, while the hearts and diamonds would be distributed to their respective compartments. We say they are "resident." *A* and *B* now practise for an equal time under uniform conditions until they can distribute the pack of 52 in about 55 seconds. They, then, exchange work and although the cards are stacked the same for both series, *A* manifestly will have to learn the location of 13 heart boxes and *B* 13 club boxes; this in itself is a trifle, but it is coupled with the fact that the *directions* of the movements from box to box have made for each subject about 48, out of 52 possible, changes—a high percentage of motor interference. A further study of the consequences of the exchange of work shows that 25 per cent. of the sensory processes of the new work is identical with that of the old, while 75 per cent. is different and causes interference.[10] If now the distributing practise be continued until the former speed is attained ample opportunity is given to study the operation and fate of transferable and interferable motor and sensory processes, respectively. And of course material is furnished for two "learning curves," one for the first and one for the second series. Doubtless several other problems solvable with this material and methods will occur to the psychologist. In this connection it may be stated that it has been demonstrated that the playing cards and the case constitute a psychotechnical instrument for scientific study of certain industrial operations. This has already been demonstrated by their application to the psychological problems involved in the distribution of mail to letter cases as done by post-office and railway mail clerks.

Picture Postcards.—The value of pictures for *aussage,* memory and imaginative tests is now generally recognized together with possibilities for the study of the more intricate problems of feelings and attitudes. The technique and methods in these latter problems have not kept pace with those devised for the study of sensations and the will. The more complacent methods of introspection are to no purpose in the study of feelings and emotions since they do not come to order in the laboratory nor wait for introspective analysis; and the physiographic methods hitherto employed require considerable supplementing before the nature and relationships of the feeling consciousness are fully understood.

Some attempt has been made to use the reproductions of classic paintings in the study

[10] For the basis and methods by which these quantities are determined see Kline and Owens, *Psych. Rev.*, Vol. 20, p. 224, 1913.

of feeling-tones only. And while such pictures are easily available their application is limited, for they are usually regarded by observers as pleasant or indifferent, seldom distinctly unpleasant. Their use is thus confined almost wholly in one direction, viz., that of esthetics. It is quite desirable to secure material capable of stimulating a wide range of feelings if we would make appreciable progress in their study. It appears that the advent of the picture postcards with their standard size, well-nigh endless variety and low price have more than supplied the experimental deficiencies of the classic pictures. The picture postcards make an appeal to the whole gamut of human affections. The technique for experimental purposes consists in selecting, adapting and in manipulating the cards so as to bring specific feelings into relief. To indicate uses as well as difficulties a few examples are submitted. The emotions that may be produced under laboratory conditions will always be rather feeble and so difficult to describe. The difficulty may be partially overcome by the use of picture postcards as material, some appropriate device for exposure and the law of dissociation as a method. According to James[11] the law of dissociation by varying concomitants holds for feelings as well as for sensations. The law states:

> What is associated now with one thing and now with another tends to become dissociated from either, and to grow into an object of abstract contemplation.

By alternating one picture with various others it is possible to bring to notice obscure feeling responses that would otherwise go unreported, *e. g.*, if a picture of children at play is alternated with that of a beautiful woman; it is often hard for an observer to say anything further than that the pictures seem to go well together. But if the picture of a drunkard be substituted for that of the woman, not only does the disgust at the new combination serve for an interesting study, but the former feelings can now be more readily described. We are thus furnished with a key to discover which feelings inhibit each other, which reinforce each other by contrast, and which fuse into one of a more general attitude. In short we are on the road to an analysis and synthesis of feelings.

The feelings aroused by the senses that respond to the stimuli of the outer or external world are usually objectified, *i. e.*, referred to the source of stimulation. For this reason observers are often at an utter loss to give an account of their attitude or to describe their feelings in response to a picture.[12] The psychologist's only refuge here is to call for repeated descriptions of the picture and to interpret the description in psychological terms. It is not difficult to devise conditions for readily repeating observations of the cards, and thereby enable the observer to carry the description a little farther each time. These descriptions, when carefully made, not only reveal the observers' feelings and attitudes but demonstrate the way in which apperception depends upon attitudes. These studies with the picture postcards have a practical bearing upon certain problems such as the order in which pictures should be hung in galleries, and the proper sequence and time exposure of lantern slides in illustrated lectures.

LINUS W. KLINE,
CHESTER E. KELLOGG

[11] "Psychology, Briefer Course," p. 251.

[12] G. Santayana, "The Sense of Beauty."

SOCIETIES AND ACADEMIES

THE ILLINOIS ACADEMY OF SCIENCE

THE seventh annual meeting of the Illinois Academy of Science was held in the engineering building of the Northwestern University, at Evanston, February 19 and 20, 1914, under the presidency of Frank W. DeWolf, director of the State Geological Survey. At the Friday session the following addresses were given:

"Recent Investigations of the Mineral Resources of the Country," by the president.

"Earth Tides," by Professor A. A. Michelson.

"The International Phytogeographical Excursion," by Professor H. C. Cowles.

"Recent Theories of Fertilization and Parthenogenesis," by Professor F. R. Lillie.